Inside lock lever 24 is pivotally mounted relative to the latch. Lock lever 24 pivots about an axis that is orthogonal to both the motor shaft axis and the cam axis. Normally, a mounting plate extends from the latch to facilitate mounting of the lock lever 24.

Inside lock lever 24 is conventionally shaped to provide operative connections to an inside locking mechanism and operatively connect to the latch. Inside lock lever 24 is provided with a stop lever 28 that is connected thereto by a hollow shaft 26. Pivotal movement of the inside lock lever 24 responsively pivots the stop lever 28 between first and second positions. Inside lock lever 24 also has a pair of feet defining a fork 36.

Outside lock lever 30 is pivotally mounted relative to the latch. Lock lever 30 pivots about an axis parallel to the axis of the cam 16. Outside lock lever 30 has a tab 31 that operatively connects the lever 30 to the outside locking mechanism, in a manner well know in the art. Outside locking lever 30 has an arm 33 extending from a collar 35, provided to facilitate the pivotal mounting. The distal end of the arm 33 to opposed cam follower surfaces 32A and 32B are located. Additionally, a ball 34 extends from the arm 33.

Inside lock lever 24 is operatively interconnected with the outside lock lever 30 via ball 34 and fork 36 linkage 38. In the illustrated embodiment, the levers 24 and 30 are at one extremity of travel in Fig. 1A and at an opposite extremity of travel in Fig. 1B. Arrows 40 show the motions of the levers 24, 30 when actuated. Similarly, in Fig. 1A the cam 16 is at one extremity of its travel and Fig. 1B the cam is at an opposite extremity of its travel. Consequently in Fig. 1A the cam 16 rotates in a direction 42 and in Fig. 1B the cam 16 rotates in opposing direction 42'

The motor 12 is actuated in one sense to drive the cam 16 in one direction and in the other sense to drive the cam 16 in the other direction, as explained in greater detail below.

In Fig. 6, the position of the cam 16 corresponds to that shown in Fig. 1A. In order to reach this position, the cam 16 and lock levers 24, 30 were initially in the position shown in Fig. 1B. The motor 12 is interconnected to the cam 16 via the gear train 14, so the motor is actuated to cause the cam 16 to rotate in direction 42' (Fig. 1B). As the cam 16 rotates, the cam driving member 18B engages the cam follower surface 32B of the outside lock lever 30 (as seen best in Fig. 6). The cam driving member 18B follows an arcuate path 42' defined by cam 16 and the cam follower surface 32B follows a different arcuate path 46 (see Fig. 6). Consequently, the cam driving member 18B eventually disengages from the cam follower surface 32B, as shown best in Fig. 6. As seen best in Figs. 1A and 6, the cam 16 is prevented from further revolution by the cam stop member 20B which abuts the stop lever 28 of shaft 26.

At this point, with the cam driving member 18B being in disengaged alignment with the outside lock lever 30, either lock lever 24, 30 (the two being articulated, as described above) is free to travel reversely (to the left in Fig. 6) without driving the cam 16. The housing, not shown, prevents the lock levers 24, 30 from continuing to travel along the arcuate path 46 (clockwise in Fig. 6). Consequently, the vehicle may be manually locked, or unlocked, as the case may be, without back driving the motor 12.

In one embodiment a sensor (not shown) may be employed to determine the position of the outside lock lever 30 relative to the cam 16. This enables control logic to determine the rotational sense required of the motor. Thus, for instance, if the levers 24, 30 are manually reversed in Fig. 6, the cam follower face 32A will be positioned adjacent to the cam driving member 18A. At the same time, due to the rigid connection between the rocker 26 and the inside lock lever 24, the rocker 26 pivots such that cam stop member 20A abuts stop 28. On the next power cycle, the control logic actuates the motor 12 to drive the cam 16 clockwise in Fig. 6 such that cam driving member 18A engages cam follower surface 32B of the outside lock lever 30.

Alternatively, if the lock levers 24, 30 are not manually activated or are manually returned to the position shown in Fig. 6, on the next power cycle the control logic actuates the motor 12 to drive the cam 16 counterclockwise in Fig. 6. In this case, the cam driving member 18B engages cam follower surface 32A to reverse the lock levers 24, 30. Simultaneously, the rocker 26 pivots such that the cam stop member 20B abuts stop 28 as shown in Fig. 1B to prevent continued travel of the cam. The operation of the actuator 10 henceforth is similar to that already described with respect to the other operating position shown in Figs 1A and 6.

In an alternative embodiment the sensor can be omitted. If the device 10 is in the locked position and the motor is driven in the locking sense, the motor will stall since cam stop member 20A or 20B abuts the stop 28 of rocker 26. Similarly, if the device 10 is in the unlocked position and the motor is driven in the unlocking sense, the motor will stall since cam stop member 20A or 20B abuts the stop 28 of rocker 26.

The outside lock lever 30 includes a passage 50 sized to accept a shaft 48 of cam 16 without interference from the travel of the lock lever 30.

While the illustrated embodiment has shown the cam 16 driving the outside lock lever 30 and the rocker 26 connected to the inside lock lever 24, it will be appreciated that in the alternative the cam 16 can drive the inside lock lever 24 with the rocker 26 being connected to the outside lock lever 30.

The illustrated embodiment offers following advantages:

a) No additional parts are required – the inside lock lever 24, outside lock lever 30 and a power actuator such as the motor 12 and gear train 14 or a solenoid or pneumatic arrangement are part of the lock mechanism. The illustrated embodiment includes a novel arrangement forcing the levers 24 and 30 to stop at a desired position. No clutch part(s) has to be added.

What is claimed is:

1. An actuator for a latch, comprising:

first and second articulated levers, wherein said first lever includes at least one cam follower and said second lever includes at least one stop member which pivots between first and second positions as each said lever travels between first and second positions;

a cam having at least one cam driving member and at least one cam stop member;

a power actuator operatively engaging said cam effecting driving movement of said cam;

said at least one cam driving member having a path of travel which is in engaging alignment with said at least one cam follower for a portion of said travel and is in disengaging alignment with said at least one cam follower for another portion of said travel;

wherein said at least one cam stop member abuts said at least one lever stop member when said at least one cam driving member is in said non-aligned position whereby said levers may be activated without driving said cam.

2. An actuator according to claim 1, wherein driving said cam by energizing said actuator effects the pivoting of said first and second levers between said first and second positions or vice versa.

3. An actuator according to claim 2, wherein said first and second levers are disposed substantially orthogonal to one another.

4. An actuator according to claim 3, wherein said first and second levers are articulated via a ball and fork linkage.

5. An actuator according to claim 3, wherein said at least one lever stop member comprises a shaft extending from said second lever in a direction substantially parallel